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Indian Standard

CODE OF PRACTICE FOR CHROMATE CONVERSION COATING ON ZINC AND CADMIUM COATED ARTICLES AND ZINC BASE ALLOYS

(First Revision)

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CODE OF PRACTICE FOR CHROMATE CONVERSION COATING ON ZINC AND CADMIUM COATED ARTICLES AND ZINC BASE ALLOYS

(First Revision)

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Indian Standard

CODE OF PRACTICE FOR CHROMATE CONVERSION COATING ON ZINC AND CADMIUM COATED ARTICLES AND ZINC BASE ALLOYS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 29 September 1977, after the draft finalized by the Metallic Finishes Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 Chromating treatment is employed for providing protection to zinc and cadmium coated articles and zinc base alloys as it retards the formation of corrosion products on the surface. These coatings are normally applied by dipping. The chromating solutions are usually acid and contain hexavalent chromium salts together with other salts which may be varied to affect the appearance and hardness of the film. The colour of the film and, therefore, the type of conversion coating depends upon, (a) the composition of chromated solution, (b) *p*H and temperature of the solution, (c) the duration of treatment and nature and the surface condition of the coating being treated.

0.3 This standard was published in 1959. In this revision more details of procedure have been given which should be strictly followed. For example, the time of rinsing should be kept as short as possible in order to prevent the dissolution of hexavalent chromium. The drying of the article should be carried out at the specified temperature as otherwise it may result in cracking due to dehydration of the chromate coating. These coatings harden with age by gradual dehydration and therefore it is necessary to handle them with care for the first 24 hours after treatment (any heat treatment for the relief of hydrogen embrittlement should be carried out before a chromate conversion coating is applied).

0.4 For testing chromate conversion coating reference may be made to IS : 8602-1977*.

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*Methods of tests for chromate conversion coatings on zinc and cadmium surfaces.

0.5 In the formulation of this standard due weightage has been given to international co-ordination among standards and practices prevailing in different countries in addition to the practices followed in the field in this country. This has been met by driving assistance from British Defence Specification DEF-130-1961 Chromate passivation of cadmium and zinc surfaces.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This code lays down the procedure for providing protective coating, on zinc and cadmium coated articles and zinc base alloys intended primarily to prevent or reduce their corrosion under humid conditions.

2. QUALITY OF CHEMICALS

2.1 The quality of chemicals used in the preservation treatment shall be such that it does not effect the process.

3. PREPARATION OF SURFACE

3.1 All surfaces shall be free from oil and grease and residues of plating and cleaning solutions. Oily and greasy components shall be degreased in trichloroethylene (*see* IS : 245-1970†) or other suitable solvent. Freshly plated components and those which have not been contaminated with oil or grease (for example, for handling) may not require degreasing.

3.2 After solvent degreasing, the component should be treated by immersion for 5 to 15 minutes in a boiling solution containing 45 to 50 g of trisodium phosphate ($Na_3PO_4 . 12H_2O$) (*see* IS : 573-1973‡) per litre of water. While preparing the solution, soft water should preferably be used. Electrolytic treatment in the boiling or near boiling solutions may be used, if required, at a current density of $5 A/dm^2$ for one minute.

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*Rules for rounding off numerical values (*revised*).

†Specification for trichloroethylene, technical (*second revision*).

‡Specification for trisodium phosphate (*first revision*).

3.3 Washing Prior to Passivation — Components shall be thoroughly washed in cold running water to remove all electrolyte or cleaning solution. Excess water shall be removed from the components by draining. Immediately before passivation, components may be immersed for not more than 10 seconds in a weak solution of nitric or sulphuric acid. This acid dip shall not contain more than 1 ml of concentrated acid per litre.

4. CHROMATE TREATMENT

4.1 The components should be immersed in a solution containing 150 to 200 g of potassium or sodium dichromate and 5·5 to 10·0 ml of concentrated sulphuric acid (r.d. = 1·84) per litre for 5 to 10 seconds.

NOTE 1 — The duration of immersion may be increased to 20 seconds, *Max.*

NOTE 2 — With the progressive use of the solution, the chemical composition of the water will change which will effect the formation of the film. Care will have to be taken therefore, to maintain the correct strength of the bath.

NOTE 3 — Instead of the dichromate solution mentioned above, any proprietary chromate conversion coating solution may be used.

NOTE 4 — Bleaching treatment shall not be used.

4.2 Chromate treated parts shall then be rapidly transferred to two successive tanks of cold running water. The normal time of rinsing is a few seconds in the first tank and about one minute in the second tank. The parts shall then be dried by circulation of hot air, taking care that the temperature of the component shall not be raised above 50°C. Immersion in hot water not above 50°C for a period not more than 30 seconds is permissible to assist drying. In no circumstances shall boiling water be used.

4.3 The time of immersion and the chemical composition of the bath should be strictly controlled and maintained.

4.4 The chromate film may have an irridescent green or yellowish green appearance but should be free from bare patches. Sometimes, there may be a tendency of light khaki or greyish film to be developed. The colour of the coating, however, may be agreed to between the supplier and the purchaser.

5. RETREATMENT

5.1 If the specific film is not satisfactory, components may be re-passivated either directly or after removal as far as possible of the old film by immersion for a few minutes in a boiling solution of sulphate-free chromic acid (100 g CrO_3/l) followed by the trisodium phosphate cleaning as in **3.2.** When a passivated component has been heated (for example, to stove a lacquer applied on part of the surface), direct re-passivation may be applicable to restore the passivation on the unlacquered surface.

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